

**PATENT COOPERATION TREATY
PCT**

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 10 JUN 2005

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Applicant's or agent's file reference F19942	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/AU2004/000809	International filing date (day/month/year) 21 June 2004	Priority date (day/month/year) 20 June 2003	
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ C25C 5/00, C22B 9/14, 34/12			
Applicant BHP BILLITON INNOVATION PTY LTD et al			

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>	
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>	

Date of submission of the demand 7 September 2004	Date of completion of the report 31 May 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer DAVID K. BELL Telephone No. (02) 6283 2309

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/000809

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1 (b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
 - ☒ the international application as originally filed/furnished
 - ☐ the description:

pages	as originally filed/furnished	
pages*	received by this Authority on	with the letter of
pages*	received by this Authority on	with the letter of
 - ☐ the claims:

pages	as originally filed/furnished	
pages*	as amended (together with any statement) under Article 19	
pages*	received by this Authority on	with the letter of
pages*	received by this Authority on	with the letter of
 - ☐ the drawings:

pages	as originally filed/furnished	
pages*	received by this Authority on	with the letter of
pages*	received by this Authority on	with the letter of
 - ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1 to 23	YES
	Claims	NO
Inventive step (IS)	Claims 1 to 23	YES
	Claims	NO
Industrial applicability (IA)	Claims 1 to 23	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

- D1 = WO 2004/053201
D2 = Derwent Abstract Accession No 2004-185614/18 & JP 2004052037
D3 = Derwent Abstract Accession No 2003-372523/35 & WO 2003/038156
D4 = US 6540902
D5 = US 20040060826

The invention as defined in the present application is a continuous or semi-continuous process for electrochemically reducing a metal oxide powder and/or pellets in a solid state where the metal oxide powder and/or pellets are continuously or semi-continuously fed into a molten electrolyte bath such that the metal oxide powder/pellets is deposited on an upper surface of a horizontally disposed or slightly inclined cathode, causing the metal oxide powder/pellets to move over the upper surface of the cathode towards the forward end of the cathode whereby electrochemical reduction of the metal oxide to metal occurs and continuously or semi-continuously removing at least partially electrochemically reduced metal oxide powder/pellets from the molten electrolyte bath. The document D1 is the closest related art and also discloses a continuous or semi-continuous process for electrochemically reducing a metal oxide powder and/or pellets in a solid state.

However the cited document does not disclose the use of a horizontally disposed or slightly inclined cathode nor does it disclose the step of 'causing metal oxide powder and/or pellets to move forward over a horizontally disposed or slightly inclined upper surface of the cathode so that the powder and/or pellets move toward the forward end of the cathode in contact with molten electrolyte whereby electrochemical reduction of the metal oxide to metal occurs as the powder and/or pellets move forward'.

Therefore none of the cited documents either singly, nor in obvious combination, disclose or fairly suggest the invention as defined in the present claims. The claimed invention is therefore novel, has an inventive step and is industrially applicable.

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Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

<u>Application No.</u> <u>Patent No.</u>	<u>Publication date</u> <u>(day/month/year)</u>	<u>Filing date</u> <u>(day/month/year)</u>	<u>Priority date (valid claim)</u> <u>(day/month/year)</u>
WO 2004/053201	24 June 2004	12 December 2003	12 December 2002
JP 2004-052037	19 February 2004	19 July 2002	
US 2004/0060826	1 April 2004	19 November 2002	27 September 2002

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure

Date of non-written disclosure
(day/month/year)

Date of written disclosure
referring to non-written disclosure
(day/month/year)